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PHOTOGRAPHIC PRIMER

FOR THE USE OF BEGINNERS IN THE
COLLODION PROCESS.

BY JOSEPH CUNDALL.

ILLUSTRATED WITH A FACSIMILE OF A PHOTOGRAPHIC PICTURE
OF BIRDS, SHOWING THE DIFFERENCE OF TONE
PRODUCED BY VARIOUS COLOURS.

LONDON:
PHOTOGRAPHIC INSTITUTION,
168 NEW BOND STREET.

1854.

In the hope that a few simple directions given in plain language may help beginners in Photography, this Primer has been written.

J. C.

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APPARATUS.

(For Landscapes 10 in. by 8 in., and Portraits 6 x 5 in.)

1. A Folding Camera, with two slides, for glass plates.
 2. A Tripod Stand.
 3. A Single Lens, 3 in. in diameter.
 4. Three Diaphragms. (*Supplied with the Lens.*)
 5. A Focussing Cloth.
 6. A Box of Glass Plates, 10 in. by 8 in.
A Box of Glass Plates, 8½ in. by 6½ in.
A Box of Glass Plates, 6 in. by 5 in.
 7. A Leather Buff.
 8. A Gutta Percha Bath, 12 in. by 9 in.
A Gutta Percha Bath, 7 in. by 6 in.
 9. A Glass Dipper, 13 in. long, and ditto 8 in. long.
 10. A Gutta Percha Bottle.
 11. A Plate Holder.
 12. A Developing Stand.
 13. A Spirit Level.
 14. A deep Gutta Percha Tray.
 15. Three Gutta Percha Funnels.
 16. Two Glass Stirring Rods.
 17. A Box of Scales, with Glass Pans.
 18. A Graduated half-pint Glass Measure.
 19. Three Glass Measures, one 3-oz., one 1-oz., one 1-drachm.
 20. Three Stoppered Bottles, one 2-oz., two 6-oz.
 21. A Yellow Curtain.
-

FOR THE PRINTING PROCESS.

22. A Pressure Frame, 11 in. by 9 in.
23. Four Gutta Percha Trays.
24. Three quires Albumenized Paper, one quire of Salted Paper, one quire of Filtering Paper, and two quires of Prepared Bibulous Paper.

CHEMICALS.

(Sufficient for Fifty or more Pictures.)

25. 16 oz. Collodion (*Xylo-Iodide of Silver*), uniodized,
and 5 oz. Iodizing Solution.
 26. 40 oz. Nitrate of Silver Solution, 30 gr. to the oz.
 27. $\frac{1}{2}$ oz. Pyrogallic Acid, and
5 oz. Glacial Acetic Acid.
 28. 1 lb. Hyposulphite of Soda.
 29. 3 oz. Crystal Varnish.
 30. 3 oz. Rectified Ether.
 31. 2 oz. Nitrate of Silver in Crystals.
 32. 3 oz. Solution of Ammonia and Tripoli.
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FOR THE PRINTING PROCESS.

33. 16 oz. Nitrate of Silver Solution, 60 gr. to the oz.
 34. 16 oz. Hyposulphite Bath, with Colouring Solution.
 35. 16 oz. Hyposulphite Bath for Fixing.
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TO CLEAN THE HANDS OR LINEN.

36. A Pot of Cyanogen Soap.
A Piece of Pumice Stone.
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CASES.

- A Leather Case for the Camera.
- A " " for the Lens.
- A " " for the Chemicals.
- A Mahogany Case for the Glass Dipper.
- A " Box for Stock of Chemicals.
- A Packing-Case to contain all except the Tripod legs.

CHOICE OF APPARATUS.

1. THE most desirable CAMERA for a beginner in Photography is a folding and sliding camera (with an adjusting front), which will give pictures 10 in. by 8 in., and which (to suit a lens 3 in. in diameter,) will pull out from 10 in. to 18 in. The slide, or dark shutter at the back, should contain a frame for pictures 6 in. by 5 in., for small subjects and for practice. The focusing glass should be adjusted to the exact distance at which the prepared plate stands from the lens.
2. The most simple and inexpensive TRIPOD STAND is made of ash, with a brass top, which is fastened on without the aid of screws. The three legs are usually carried in a canvas bag, like a fishing-rod. The top must be packed with the camera.
3. A single ACHROMATIC LENS, 3 in. in diameter, is best adapted for landscapes 10 in. by

8 in. and for out-of-door practice is equally well suited for portrait-taking and for copying pictures or still life.

4. The lens must be provided with three DIAPHRAGMS, or stops, to shut out the excess of light. For a 3-in. lens the openings should be—for the largest diaphragm, $\frac{7}{8}$ of an inch in diameter; for the intermediate, $\frac{5}{8}$ in.; and for the least, $\frac{3}{8}$ in. The proper use of these diaphragms requires considerable study.
5. The best FOCUSsing CLOTH is a piece of opaque india-rubber cloth, about a yard square. For out-of-door practice it is convenient to fasten two ends with a band of india-rubber elastic, which can be fixed round the camera: otherwise the wind will frequently blow the cloth away. Should the wind, however, be high, it is not advisable to fasten the cloth on, as it would help to shake or upset the camera.
6. The GLASS PLATES must be perfectly flat, straight at the edges, and must fit *easily* into the frames in the slide. The edges of the plates should be slightly ground to prevent their cutting the hands. This may be effected by rubbing each edge lightly on a sandstone.

The boxes should be of mahogany, with notches inside to hold the glasses firmly.

7. A LEATHER BUFF is of much service in giving the final polish to the glass plate.
8. A GUTTA-PERCHA BATH, 12 in. by 9 in., with projecting feet (removable), which will cause the bath to incline a little, is the best adapted for ordinary wear and for travelling. When in use it should be provided with a cardboard (or other) cover, with a slit in it to allow the dipper to remain. A smaller bath, 7 in. by 6 in. for practice, will always be found useful.
9. The GLASS DIPPER, which is merely to assist in getting the glass plates in and out of the bath, should be an inch longer than the depth of the bath. The cross ledge of glass at the bottom of the dipper is often broken off; it can be firmly replaced if the glass be well cleaned, then heated, and cemented with marine glue.
10. A GUTTA-PERCHA BOTTLE is necessary to carry the bath solution of nitrate of silver. Care should be taken that the cork fits well. A glass bath, in which the solution can be carried about, has recently been invented.

11. A PLATE-HOLDER is very convenient, and adds much to neatness of manipulation. By means of a screw, the glass plate is held firmly while it receives the last polish, and while the collodion is poured upon it.
12. The DEVELOPING STAND saves the hands from being soiled by the nitrate of silver. The screws should be adjusted until the glass-plate lies perfectly level upon them.
13. A little instrument called a SPIRIT LEVEL is very useful in determining this.
14. In the absence of any more perfect contrivance, a deep GUTTA-PERCHA TRAY is desirable, in which to place the stand during the operations of developing and fixing the picture. When the same room is to be used for a length of time, a gutta-percha tube can be added to carry off the waste water.
15. Three GUTTA-PERCHA FUNNELS are desirable: one to be kept exclusively for the use of nitrate of silver; the second, for filtering the developing solution (*See* 27); and the third, for hyposulphite of soda.

16. Two GLASS STIRRING-RODS are requisite—one to assist in dissolving nitrate of silver, and the second in making the developing solution.
17. A BOX OF SCALES, with glass pans and weights from 1 gr. to 1 oz., is necessary for weighing the quantities of the chemicals.
18. A half-pint graduated GLASS VESSEL is wanted to measure the various solutions; and
19. Three smaller GLASS MEASURES are required for the same purpose, and for holding the developing solution when in use. One 3 oz., one 1 oz., and one 1 drachm.
20. Three STOPPERED BOTTLES are required—one holding 2 oz. for the iodized collodion; one of 6 oz. for the developing solution; and one of 6 oz. for the solution of hyposulphite of soda.
21. A CURTAIN of three thicknesses of yellow calico, or other transparent yellow material, must be fastened against the window of the room used to develop in, in such a way that no rays of white light can possibly penetrate.

APPARATUS FOR THE PRINTING PROCESS.

22. A PRESSURE FRAME of mahogany, with thick plate-glass front, is found to wear best. It ought to be at least an inch each way larger than the glass-plates used. A thick sheet of felt, or several thicknesses of bibulous paper, should be placed between the glass-plate and the back-board.
23. Four GUTTA-PERCHA TRAYS are desirable — one for nitrate of silver; two for the hypo-sulphite solutions; and one for clean water.
24. Three quires of ALBUMENIZED PAPER and one quire of SALTED PAPER will suffice for one hundred pictures; one quire of FILTERING PAPER is necessary for filtering the nitrate of silver bath; and two quires of prepared BIBULOUS PAPER are requisite for blotting up and other purposes.

TO PREPARE THE CHEMICALS.

* * These should all be kept in a cool place.

25. THE COLLODION.—Measure into a 2-oz. stoppered bottle $1\frac{1}{2}$ oz. of the collodion (*xylo-iodide of silver*) and add $\frac{1}{2}$ oz. of the iodizing solution. Shake them well together, and let the bottle stand at least an hour before use. Collodion is made of gun-cotton dissolved in ether; the stopper must always be kept in the bottle, or the ether will evaporate. The iodized collodion will remain good for about a fortnight or three weeks, if kept well stoppered, and in an even low temperature.

The measures and bottles used for mixing the collodion should previously be rinsed with ether.

26. THE NITRATE OF SILVER BATH.—40 oz. of this solution will allow of a little surplus to replenish the waste of the bath, which should be kept full to within one inch of the top. The solution is made thus,—

Distilled Water . 1 oz.

Nitrate of Silver . 30 gr.

For 40 oz., therefore, 1200 gr., or $2\frac{1}{2}$ oz., of

nitrate of silver will be needed. Fill a 10-oz. glass measure with *distilled* water, throw the crystals of nitrate of silver into it, and help to break them by means of a glass rod; when all are dissolved, pour the solution in the gutta-percha bath. Then add 30 oz. of distilled water. This solution, if kept quite clean, will remain in good order for years. Whenever it is not perfectly clear, it must be filtered through prepared filtering paper.

All glass or gutta-percha vessels used for making or holding solutions of nitrate of silver should be rinsed with distilled water.

27. The DEVELOPING SOLUTION.—This is made in the following proportions:—

Distilled Water . 1 oz.

Pyrogallic Acid . 3 gr.

Glacial Acetic Acid $\frac{1}{2}$ dr.

To fill a 6-oz. bottle, therefore, weigh out 18 gr. of pyrogallic acid, and pour upon it 6 oz. of distilled water—filter *carefully* through prepared filtering paper, and add 3 dr. of glacial acetic acid—shake it, and the solution is fit for use. This solution will keep in good order for about a month in the summer time, and longer in winter.

If distilled water cannot be readily procured, boiled rain-water may be substituted.

28. The **FIXING SOLUTION**.—For this solution take,

Clean Water (*warm*) 1 pint

Hyposulphite of Soda 1 lb.

Shake it up well two or three times, and in an hour it will be ready for use.

Take great care that no hyposulphite of soda fall into any of the other solutions, or come in contact with the glass plates. It is necessary always to wash the fingers after touching it.

29. **CRYSTAL VARNISH**.—This is usually sold in bottles by the photographic chemists. The best is made of amber dissolved in chloroform.

30. **ETHER** is used to wash out bottles and measures before collodion or crystal varnish is put into them.

31. **NITRATE OF SILVER** in crystals is wanted to replenish the bath, or for exciting the paper for printing: always use *distilled* water with it.

32. A weak solution of **AMMONIA** and **TRIPOLI** is useful to clean the glass plates with.

Clean Water . . . 1½ oz.

Ammoniaë Liquor . . ½ oz.

Tripoli 1 dr.

TO PREPARE THE DARKENED ROOM.

IN order to DEVELOPE a PHOTOGRAPHIC PICTURE, a darkened chamber of some kind is indispensable. The most convenient is a small room, with only one window, looking towards the north (to avoid the sun's rays). Cover over a space of the window of about two feet square,—nearly on a level with a table,—with a curtain of three thicknesses of yellow calico (*See 21*), and then by means of shutters and black calico, or some other contrivance, exclude all other light from the room. The yellow light is sufficient to work by, and any white light admitted from the sides of the window, or from the door, might frequently spoil a picture. Place on the table, close to the window, a gutta-percha tray (*See 14*) to hold the waste water, and in this tray let the developing stand be arranged perfectly level. This can most readily be done by means of a spirit-level, but a marble, or any round substance, will help to determine a true level. Provide a good supply of clean water, a pint

jug with a spout, a hand-basin to rinse the fingers in, and a towel to wipe them, two or three clean linen cloths to wipe the glass plates with, and one or two fine white linen cloths with which to give them a final polish.

Dark Tents for working at a distance from home can readily be made.

TO PREPARE THE CAMERA.

When the camera is fastened to the tripod-stand, pull the camera out to its full extent, place the slide in its proper place, and before the lens is screwed on, look through the hole for the lens, and ascertain if any light enters the camera: if there be any, it must be carefully excluded. Then screw on the lens, take out the slide, and put the focussing glass in its place. When the subject of the picture is fixed upon, set the camera at the spot from which the desired view is to be taken, cover the head and the focussing glass with the cloth, and move the sliding portion of the camera, or the rack-work of the lens, or both, backwards or forwards until the image on the ground glass is at its *greatest distinctness*. This is termed the focus. Place the cap on the lens, and now prepare the glass plate.

TO TAKE A PHOTOGRAPHIC PICTURE.

FIRST OPERATION.

TO CLEAN THE GLASS PLATE.

Dip a linen rag into the solution of ammonia and tripoli (*See 32*), and rub it well over both sides of the glass plate; then plunge the plate into a basin of clean water, and rub it well all over with a second rag. Then, to make quite sure that all the ammonia is got rid of, immerse the plate in a second basin of water. Let it stand aside to drain. When nearly dry, rub it well with a clean linen cloth,* and polish it with a second cloth or a leather buff,—taking care that not a particle of any kind remains on the glass. It is advisable to clean a dozen or more glass plates at a time, and to put them by in a plate-box ready for use.

* The glass-cloths must not be washed with soap.

SECOND OPERATION.

TO COVER THE PLATE WITH
COLLODION.

Fix the glass plate firmly in the plate-holder, with at least 2 in. of the glass projecting towards the right hand, and taking the holder in the left hand, pour the iodized collodion (*See 25*), from the 2-oz. bottle, gently upon the centre of the plate, where it should form a gradually-widening circle. When about half the surface of the plate is covered, stop pouring—tilt the plate towards the left hand, so that the collodion shall first cover that corner, then let it run to the opposite left-hand corner; then tilt the plate downwards a little, and let it run to the further right-hand corner; and then hold the collodion bottle under the nearest right-hand corner, and let all the superfluous collodion run off into it. Before it is quite finished running, move the glass plate quickly up and down,—keeping the corner in the neck of the bottle,—to prevent the collodion from forming in waves. Thus much may be done by daylight, but it is now necessary to be shut up in the darkened chamber. After a few seconds take the plate with the left hand at the further right-hand corner,

unscrew the plate-holder, and place the glass plate upon the dipper. Then follows the

THIRD OPERATION.

TO EXCITE THE COLLODION PLATE.

Immerse the plate thus prepared into the nitrate of silver bath (*See 26*), gently but without any hesitation, for if a stop is made a line will be formed across the picture. Let the plate remain two* minutes—then raise it out, and immerse it again six or eight times, until the surface of the collodion is perfectly even and smooth and of a primrose colour. Remove the plate from the dipper by the same corner it was held before, drain it for at least half a minute, and lay it face downwards in the slide,—place a small piece of bibulous paper on the back to suck up the superfluous fluid—shut it carefully up so that no light can possibly get to it, and it is ready for the

FOURTH OPERATION.

TO EXPOSE THE PLATE.

The collodion plate should be exposed to the action of light within five minutes after it has left the nitrate of silver bath.

* It *may* remain ten minutes or more without much detriment.

Take out the focussing-glass from the camera (having previously ascertained that the picture is in focus)—place the slide (with its back outwards) in its place—see that the cap is on the lens—raise the inner shutter of the slide, and now, if all is ready, take off the cap from the lens.

The time of exposure varies so much according to the weather, the time of day, the lens, and the size of the diaphragm used, that no certain directions can be given. With a Ross's No. 3 landscape lens, and with the smallest diaphragm, a white building may be taken on a bright day in summer in forty seconds, or a landscape in sixty or eighty seconds, and with the largest diaphragm in half the time: a portrait may be taken in twelve or twenty seconds;* but in cold or dull weather, perhaps, double these times would not suffice. The smallest diaphragm should always be used for landscapes when there is a good light; it increases the *sharpness* of the picture, enables the lens to produce greater perfection at the edges of the picture, and although

* For portraits of children or animals a double lens is indispensable. With a Ross's No. 3 double lens a picture may be taken on a fine day in a quarter of a second: but better photographs are obtained by using a diaphragm, and giving from six to twelve seconds.

it necessitates a longer exposure, this is amply repaid by the effects it produces. When the time determined on is over, place the cap on the lens, let down the shutter, and take the slide back to the darkened chamber.

FIFTH OPERATION.

TO DEVELOPE THE PICTURE.

After having carefully excluded all white light from the room, take the plate from the slide, and lay it face upwards on the developing stand, which ought previously to have been rendered quite level. If the plate be 6 in. by 5 in. pour 4 dr. of the developing fluid (*See 27*) into a *clean* ounce measure, and add 4 dr. of clean water; throw this dexterously on to the collodion plate so as to cover it all over at the same instant.* Blow the liquid to any corner it has not reached, and gently agitate it by blowing for about a minute—then raise the plate at one corner, and let *all* the developing fluid run back into the glass measure from one of the corners. Hold the plate up to the yellow light and look through it; if the image be vigorous, and definition can

* If the liquid is not evenly spread a stain will inevitably be formed.

be seen in the half shadows—that is, if in a building the brick-work in the shadow under the eaves is to be traced, and if the deepest tones, such as the blackest shadows, are quite transparent, then the time of exposure was correct. If the picture appear slowly, and if it be transparent in the half-shadows when the glass is held up to the yellow light, then the time was not sufficient; but if the picture come out quickly, and is dull or red when held to the light, then the time given was too much.

Occasionally a picture may be improved when slightly over-exposed, by using the full strength of the developing solution, and by adding four or five drops of a solution of nitrate of silver (the same as used in the bath, a small quantity of which may be kept ready for this use in a stoppered bottle), and this is especially the case in cool weather. Indeed, when the temperature in the developing-room is under 60° , it is always advisable to use the full strength of the developing solution and to add the drops of silver.

If the glass plate used be $8\frac{1}{2}$ in. by $6\frac{1}{2}$ in. a 2-oz. glass measure will be required, and the quantity of developing must be 8 dr. with 8 dr. of water.

Practice is absolutely necessary in order to

learn to develop properly. When the picture appears *well** brought out (which should generally be within three minutes), throw the developing solution away, wash the plate freely with clean water—let this run off, and then follows the

SIXTH OPERATION.

TO FIX THE PICTURE.

Replace the glass plate on the developing stand, and pour the hyposulphite of soda solution (*See* 28) upon it until the whole plate is covered. The yellow iodide of silver which was formed in the collodion while immersed in the bath will gradually be dissolved away. In three minutes it is usually all gone—(this can easily be seen by looking at the back of the plate)—then return the hyposulphite into its bottle, or jug, which is more convenient, and wash the plate thoroughly with clean water, and at the same time wash the hands well. Pour at least two or three pints of water on to

* A beginner should endeavour to see a good negative picture. When held up to the light it should appear very vigorous—the whites of the picture should be as black as ink—the deepest shadows quite transparent, and the various colours in the picture should all give different degrees of lightness or depth.

a plate 6 in. by 5 in., and double that quantity on to a larger plate. If this be neglected the hyposulphite will certainly destroy the picture. Tilt the plate until it is well drained, and then set it up to dry.

SEVENTH OPERATION.

TO VARNISH THE PLATE.

When the plate is *perfectly* dry, hold it by one corner with as little of the thumb on the collodion as possible, and pour the crystal varnish upon the surface exactly in the same way as the collodion—the varnish runs more freely, and is more easy to manage—drain off the superfluous quantity into the bottle, and set the plate up to dry where there is no chance of dust getting to it. The next operation is to reverse the picture upon paper: this is usually called the Printing Process.

PRINTING PROCESS.

TO PREPARE THE PAPER.

Plain Paper.

CANSON'S POSITIVE PAPER is the best that is made for Photographic purposes. It is sold ready salted, or albumenized; but as many amateurs wish to prepare the paper themselves, the usual formulæ are given.

For the Salted Paper, take

Muriate of Ammonia . . . 20 gr.

Distilled Water . . . 1 oz.

Pour about 10 oz. of this solution into a clean dish or gutta-percha tray, and place* in it, one after the other, six pieces of paper, taking care to avoid air-bubbles. After immersing the last, turn the whole over, and remove them one by one, beginning with that first immersed, and pin each up by a corner to dry. The whole should be managed so that

* Some Photographers float the paper on this solution.

each sheet should remain about two minutes in the bath.

Paper thus prepared is termed plain paper to distinguish it from that more generally used called albumenized paper. Plain paper is better adapted for colouring upon.

For Albumenized Paper, take

| | |
|--|-----------|
| Whites of Eggs | 8 |
| Distilled Water | 10 oz. |
| Saturated* Solution of common Salt in Distilled Water . . | 6 dr. |
| Acetic Acid | 15 minims |

Beat this with a wooden whisk up to a firm froth, let it stand for twelve hours protected from dust, and then decant off the clear liquid. Pour a sufficient quantity of this into a flat dish, and *float* the paper very carefully for two minutes upon the surface, taking great care to avoid air-bubbles—then pin it up to dry, and afterwards smooth it by ironing each sheet separately between bibulous paper. Paper thus prepared will keep any length of time, and for use require nothing more than to be brought in contact with the exciting solution.

* A *saturated* solution is formed when the water will dissolve no more salt.

TO PREPARE THE CHEMICALS.

33. The EXCITING SOLUTION.—This is usually made in these proportions:—

Distilled Water . . 1 oz. . or 8 oz.

Nitrate of Silver . . 60 gr. . or 1 oz.

This solution may be used over and over again until it is all wasted.* It is best to pour it back from the tray into the bottle when sufficient paper has been excited; it may now and then require filtering. It answers equally for the plain or albumenized paper.

34. The HYPOSULPHITE BATH for colouring the picture is made thus:—

Clean Water . . . 16 oz.

Hyposulphite of Soda . . 2½ oz.

Chloride of Gold . . . 10 gr.

Chloride of Silver . . 60 gr.

35. The HYPOSULPHITE BATH for fixing the picture is made thus:—

Clean Water . . . 16 oz.

Hyposulphite of Soda . . ½ lb.

* It will become discoloured, but this is of no consequence.

TO EXCITE THE PAPER.

Pour the solution of Nitrate of Silver (*See* 33) into a dish or tray, used for this purpose only, to the depth of a quarter of an inch; float the paper gently on the surface* (taking care that the back be kept clean), and let it lie there for five minutes. Then pin it up to dry, or dry it hastily before the fire, and it is fit for immediate use. All this must be done in the darkened chamber, and the paper, after being excited, must be exposed as little as possible to white light, to the action of which it is now exceedingly sensitive.

TO EXPOSE THE PICTURE TO LIGHT.

Lay the pressure-frame face downwards, and remove the back-board. Place upon the plate-glass of the frame the negative glass picture, face upwards, and lay upon that a sheet of the excited paper, the prepared side downwards, with a small portion projecting over the edge of

* The glossy side of the albumenized paper is that which should be brought in contact with the solution.

the glass-plate. Cover this with a piece of thick felt, or several thicknesses of bibulous paper, replace the back-board, screw it gently down, turn up the frame, and expose the picture to daylight or the direct rays of the sun; watch the projecting piece of paper, and now and then unscrew one-half of the back-board, to observe what progress the picture is making. This should always be printed some shades darker than it is required to be, as it loses colour in the

FIXING PROCESS.

When the picture is judged to be sufficiently printed, remove it, and plunge it without delay—and taking care that no bubbles form on the paper—in the

COLOURING BATH (*See 34*),

In which it may be left from fifteen minutes to six hours; until, in fact, the picture assumes a tone that is thought desirable. It must then be removed to the

FIXING-BATH. (*See 35*.)

Let it remain in this bath for about fifteen minutes, and then place it in a

CLEAN WATER BATH.

In this bath the picture should remain for ten or twelve hours, changing the water three or four times. Pin it up to dry, and if the colour is too light, iron it under a sheet or two of bibulous paper. It is then permanently fixed, and will undergo no further change.

TO CLEAN THE HANDS.

The most effectual way to clean the fingers, when they become stained with nitrate of silver, is to moisten them, and rub them with Cyanide of Potassium; but as this is a deadly poison, a preparation called Cyanogen Soap is recommended. This should be used as soon as possible after the stains have been made.

A piece of pumice-stone rubbed down to a flat surface is also very effectual in removing fresh stains.

HINTS.

Always keep the stoppers in the bottles, except when they are in actual use.

Always cover up the nitrate of silver bath except when in use: and remember that it should be as bright as distilled water, and free from the *least* impurity.

Always rinse the fingers *well* in clean water after developing a picture, or the next will probably be spoiled.

The frames for holding the glass plates in the slide now and then require re-varnishing, as the nitrate of silver often acts on the wood, and produces stains on the picture.

Wash carefully the glass measure to contain the developing solution after every operation.

Do not let the collodion, the varnish, or the ether, come *near* any burning light—all are explosive.

Be careful that the cloths for cleaning the glass are used for no other purpose, and are free from all contamination of soap, soda, &c.

Remove carefully any dried collodion which may form about the neck of the bottle.

Particularly observe that in everything connected with photography the most scrupulous attention to cleanliness is indispensable.

WEIGHTS AND MEASURES.

APOTHECARIES' WEIGHT.

| | | | | | |
|----------|------------|-----------|----------|----------|--|
| 1 grain. | | | | | |
| 20 = | 1 scruple. | | | | |
| 60 = | 3 = | 1 drachm. | | | |
| 480 = | 24 = | 8 = | 1 ounce. | | |
| 5760 = | 288 = | 96 = | 12 = | 1 pound. | |

FLUID MEASURE.

| | | | | | |
|----------|-----------------|----------------|---------|--|--|
| 1 minim. | | | | | |
| 60 = | 1 fluid drachm. | | | | |
| 480 = | 8 = | 1 fluid ounce. | | | |
| 9600 = | 160 = | 20 = | 1 pint. | | |